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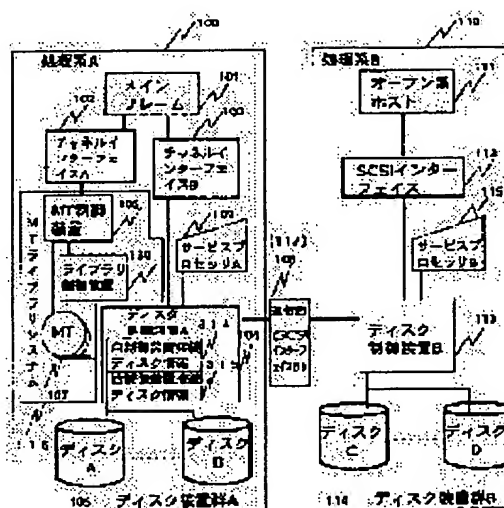
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(54) COMPOSITE COMPUTER SYSTEM AND COMPOSITE I/O SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To back up data of an I/O sub-system for opening in a backup system of main frame management which is not directly connected to this I/O sub-system.

SOLUTION: A B-system I/O sub-system (113 and 114) for opening and an A-system I/O sub-system (104 and 105) for main frame are connected by a communication means, and the A-system I/O sub-system is provided with tables 314 and 315 to assign a storage device address in its own sub-system to a storage device of the I/O sub-system for opening so that data in the B-system I/O sub-system can be accessed from the main frame for the purpose of backing up data of a disk connected to the B-system I/O sub-system in an MT library system 116, and a request in a variable length recording form accepted from the main frame is converted to a fixed length recording form of the B system, and a designated disk is accessed based on tables, and obtained data is sent to the main frame and is backed up in the backup system.



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CLAIMS

[Claim(s)]

[Claim 1] The 1st I/O subsystem which direct continuation is carried out to the 1st host computer and said 1st host computer with a variable-length record formal interface, and contains one or more external storage. The 2nd I/O subsystem which direct continuation is carried out to the 2nd host computer and said 2nd host computer with a fixed-length record formal interface, and contains one or more external storage. It is a complex computer system containing the transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem, Said table is referred to when the read/write demand according to said variable-length record formal interface is received from said 1st host computer, including the external storage address which should be carried out read/write. The device address in the external storage address included in said read/write demand It is not assigned to the external storage contained in said 1st I/O subsystem. When assigned to the external storage contained in said 2nd I/O subsystem, A means to determine to send said read/write demand according to said variable-length record formal interface to said 2nd I/O subsystem. Said read/write demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the read/write demand according to said fixed-length interface. The complex computer system characterized by having the means sent to said 2nd I/O subsystem.

[Claim 2] The 1st I/O subsystem which direct continuation is carried out to the 1st host computer and said 1st host computer with a variable-length record formal interface, and contains one or more external storage. The backup system connected to said 1st host computer, The 2nd I/O subsystem which direct continuation is carried out to the 2nd host computer and said 2nd host computer with a fixed-length record formal interface, and contains one or more external storage. It is a complex computer system containing the transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem. Said 1st host computer The lead demand according to said variable-length record formal interface is published to said 1st I/O subsystem, including the address of the external storage which should lead data. It has a means to back up the data received from said 1st I/O subsystem to said backup system. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem, Said table is referred to when the lead demand according to said variable-length record formal interface is received from said 1st host computer, including the external storage address which should be led. The device address in the external storage address included in said lead demand It is not assigned to the external storage contained in said 1st I/O subsystem. A means to determine to send said lead demand according to said variable-length record formal interface to said 2nd I/O subsystem when assigned to the external storage contained in said 2nd I/O subsystem. Said lead demand

according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the lead demand according to said fixed-length interface. The complex computer system characterized by having a means to send the data received from delivery and said 2nd I/O subsystem to said 2nd I/O subsystem to said 1st host computer.

[Claim 3] The 1st I/O subsystem which direct continuation is carried out to the 1st host computer and said 1st host computer with a variable-length record formal interface, and contains one or more external storage. The backup system connected to said 1st host computer and said 2nd host computer with a fixed-length record formal interface, and contains one or more external storage. It is a complex computer system containing the transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem. Said 1st host computer The light demand according to said variable-length record formal interface is published to said 1st I/O subsystem, including the address of the external storage which should carry out the light of the data. It has a means to send the data read from said backup system to said 1st I/O subsystem. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem stores the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem, Said table is referred to when the light demand according to said variable-length record formal interface is received from said 1st host computer, including the external storage address which should be carried out a light. The device address in the external storage address included in said light demand It is not assigned to the external storage contained in said 1st I/O subsystem. A means to determine to send said light demand according to said variable-length record formal interface to said 2nd I/O subsystem when assigned to the external storage contained in said 2nd I/O subsystem. Said light demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the light demand according to said fixed-length interface. The complex computer system characterized by having a means to send said data received from delivery and said 1st host computer to said 2nd I/O subsystem to said 2nd I/O subsystem.

[Claim 4] It connects with the 1st I/O subsystem, the 1st I/O subsystem containing one or more external storage --- this --- It is the compound I/O system connected to the host computer including the 2nd I/O subsystem containing one or more external storage. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem stores the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem, Said table is referred to when the read/write demand which specified the external storage address which should be carried out read/write is received from said host computer. The device address in said specified external storage address is not assigned to the external storage contained in said 1st I/O subsystem. The compound I/O system characterized by having a means to send said read/write demand to said 2nd I/O subsystem when assigned to the external storage contained in said 2nd I/O subsystem.

[Claim 5] The 1st I/O subsystem which has a variable-length record formal interface and contains one or more external storage, The 2nd I/O subsystem which contains one or more external storage with a fixed-length record formal interface, The transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem is included. It is the compound I/O system connected to the host computer. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem, Said table is referred to when the read/write demand according to said variable-length record formal interface is received from said host computer, including the external storage address which should be carried out read/write. The device address in the external storage address included in said read/write demand It is not assigned to the external storage contained

in said 1st I/O subsystem. When assigned to the external storage contained in said 2nd I/O subsystem, A means to determine to send said read/write demand according to said variable-length record formal interface to said 2nd I/O subsystem. Said read/write demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the read/write demand according to said fixed-length interface. The compound I/O system characterized by having the means sent to said 2nd I/O subsystem.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]

[Field of the Invention] Since access interfaces differ, this invention relates to the system which connected two or more I/O subsystems with which access interfaces differ to the system and host computer whose backup of the data of a store is enabled between the host computer which cannot carry out direct continuation, and an I/O subsystem.

[0002]

[Description of the Prior Art] arrangement of the optimal data, and the data administration facility to the large-scale memory hierarchy (storage hierarchy) who combined in the mainframe the external storage with which processing speed differs from memory capacity and an integrated storage management function aiming at efficient administration support --- substantial --- **** --- for example, DFSMS (Data Facility Storage Management Subsystem) of IBM --- corresponding --- "IBMSYSTEMS JOURNAL, Vol.28, No.1, and 1989 ---" --- the detail is indicated. The disk data of the I/O subsystem of a main frame can be backed up through this function manager to the magnetic tape with which bit cost can store cheap or mass data, or a medium called a magnetic tape library. On the other hand, in open systems, such as a personal computer and a workstation, a medium called the magnetic tape and the magnetic tape library which can store mass data like a main frame is not equipped.

[0003] Generally, with open systems, such as a personal computer and a workstation, access to a disk is performed according to the fixed-length-record format, and access to a disk is performed according to the variable-length record format called count key data format with the main frame. For this reason, the disk subsystem for main frames and the disk subsystem for open systems are constituted separately in many cases. On the other hand, at US No. 005155845, the technique which transmits and receives data is exhibited by I/O intersubsystem.

[0004]

[Problem(s) to be Solved by the Invention] Since host computers differ, in the disk subsystem for open systems, and the disk subsystem for main frames, employment of backup etc. and management are carried out according to the individual. However, as already stated, since there is no medium called the magnetic tape and the magnetic tape library which can store mass data in an open system, it is effective in it to take backup to the I/O subsystem of a main frame. However, since interfaces differ, the disk system for the usual open systems cannot carry out direct continuation with a mainframe. On the other hand, by US No. 005155845, it is not indicated to be a host computer how read/write processing to the storage system by which direct continuation is not carried out is realized.

[0005] Since access interfaces differ, the purpose of this invention is to offer the host computer which cannot carry out direct continuation, and the system which backs up the data of a store between I/O subsystems. It is offering the system which backs up the data of the I/O subsystem of an open system from the main frame with which direct continuation especially of the I/O subsystem concerned is not carried out. Moreover, other purposes of this invention are to the storage of the I/O subsystem for open systems by which direct continuation is not carried out to a main frame to enable access from a main frame. Moreover, the purpose of

further others of this invention is to offer the system which made connectable two or more I/O subsystems with which interfaces differ in a main frame.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention The 1st host computer, The 1st I/O subsystem which direct continuation is carried out to said 1st host computer with a variable-length record formal interface, and contains one or more external storage. The 2nd I/O subsystem which direct continuation is carried out to the 2nd host computer and said 2nd host computer with a fixed-length record formal interface, and contains one or more external storage. It is a complex computer system containing the transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem. Said table is referred to when the read/write demand according to said variable-length record formal interface is received from said 1st host computer, including the external storage address which should be carried out read/write. The device address in the external storage address included in said read/write demand It is not assigned to the external storage contained in said 1st I/O subsystem. When assigned to the external storage contained in said 2nd I/O subsystem, A means to determine to send said read/write demand according to said variable-length record formal interface to said 2nd I/O subsystem, Said read/write demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the read/write demand according to said fixed-length interface. He is trying to have the means sent to said 2nd I/O subsystem.

[0007] Moreover, the 1st I/O subsystem which direct continuation is carried out to the 1st host computer and said 1st host computer with a variable-length record formal interface, and contains one or more external storage. The backup system connected to said 1st host computer, The 2nd I/O subsystem which direct continuation is carried out to the 2nd host computer and said 2nd host computer with a fixed-length record formal interface, and contains one or more external storage. It is a complex computer system containing the transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem. Said 1st host computer The lead demand according to said variable-length record formal interface is published to said 1st I/O subsystem, including the address of the external storage which should lead data. It has a means to back up the data received from said 1st I/O subsystem to said backup system. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem. Said table is referred to when the lead demand according to said variable-length record formal interface is received from said 1st host computer, including the external storage address which should be led. The device address in the external storage address included in said lead demand It is not assigned to the external storage contained in said 1st I/O subsystem. A means to determine to send said lead demand according to said variable-length record formal interface to said 2nd I/O subsystem when assigned to the external storage contained in said 2nd I/O subsystem. Said lead demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the lead demand according to said fixed-length interface. He is trying to have a means to send the data received from delivery and said 2nd I/O subsystem to said 2nd I/O subsystem to said 1st host computer.

[0008] Moreover, the 1st I/O subsystem which direct continuation is carried out to the 1st host computer and said 1st host computer with a variable-length record formal interface, and contains one or more external storage. The backup system connected to said 1st host computer, The 2nd I/O subsystem which direct continuation is carried out to the 2nd host computer and said 2nd host computer with a fixed-length record formal interface, and contains one or more external storage. It is a complex computer system containing the transmitter style which

connects said 1st I/O subsystem and said 2nd I/O subsystem. Said 1st host computer The light demand according to said variable-length record formal interface is published to said 1st I/O subsystem, including the address of the external storage which should carry out the light of the data. It has a means to send the data read from said backup system to said 1st I/O subsystem. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem, Said table is referred to when the light demand according to said variable-length record formal interface is received from said 1st host computer, including the external storage address which should be carried out a light. The device address in the external storage address included in said light demand It is not assigned to the external storage contained in said 1st I/O subsystem. A means to determine to send said light demand according to said variable-length record formal interface to said 2nd I/O subsystem when assigned to the external storage contained in said 2nd I/O subsystem. Said light demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the light demand according to said fixed-length interface. He is trying to have a means to send said data received from delivery and said 1st host computer to said 2nd I/O subsystem to said 2nd I/O subsystem.

[0009] Moreover, the 1st I/O subsystem containing one or more external storage. Connect with the 1st I/O subsystem and the 2nd I/O subsystem containing one or more external storage is included, this -- It is the compound I/O system connected to the host computer. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem, Said table is referred to when the read/write demand which specified the external storage address which should be carried out read/write is received from said host computer. The device address in said specified external storage address is not assigned to the external storage contained in said 1st I/O subsystem. When assigned to the external storage contained in said 2nd I/O subsystem, he is trying to have a means to send said read/write demand to said 2nd I/O subsystem.

[0010] Moreover, the 1st I/O subsystem which has a variable-length record formal interface and contains one or more external storage. The 2nd I/O subsystem which contains one or more external storage with a fixed-length record formal interface. The transmitter style which connects said 1st I/O subsystem and said 2nd I/O subsystem is included. It is the compound I/O system connected to the host computer. Said 1st I/O subsystem The information which shows any of the external storage of the 1st or 2nd I/O subsystem the device address and this device address of external storage are assigned. The table which stores the device address in the 2nd I/O subsystem of this external storage when assigned to the external storage of the 2nd I/O subsystem, Said table is referred to when the read/write demand according to said variable-length record formal interface is received from said host computer, including the external storage address which should be carried out read/write. The device address in the external storage address included in said read/write demand It is not assigned to the external storage contained in said 1st I/O subsystem. When assigned to the external storage contained in said 2nd I/O subsystem, A means to determine to send said read/write demand according to said variable-length record formal interface to said 2nd I/O subsystem. Said read/write demand according to said variable-length record formal interface which determined to send to said 2nd I/O subsystem is changed into the read/write demand according to said fixed-length interface. He is trying to have the means sent to said 2nd I/O subsystem.

[0011]

[Embodiment of the Invention] Hereafter, a drawing explains one example of this invention. [0012] Drawing 1 is drawing showing an example of the computing system set as the object of this invention. A processor A100 consists of a main frame 101, the channel interface A102, the channel interface B103, the magnetic tape (MT) control device 106, the magnetic tape-library control device 130, the magnetic tape library 107, a disk controller A104, a disk unit group A105,

and a service processor 109. A main frame 101 accesses a disk controller A104 through the channel interface B103 according to the variable-length record format called count key data format. Here, count key data format is a record format which constitutes the record used as the unit of read/write from the three fields called a count area, the key section, and data division. At a count area, the data which an application program uses are stored in the key information for accessing this record, and data division at a record identification entry child and the key section. In addition, the magnetic tape (MT) control device 106, the magnetic tape-library control device 130, and the magnetic tape library 107 are hereafter referred to as an MT library system 116 collectively. As a memory hierarchy connected through a channel interface, there is not only a magnetic tape but an optical disk etc. Below, the case where MT library system 116 is connected is shown in an example.

[0013] The contingency equipment connection disk information 314 and the other control-devices connection disk information 315 are included in a disk controller A104. The contingency equipment connection disk information 314 and the other control-devices connection disk information 315 are the information established in order to enable access of the disk unit of an I/O subsystem by which direct continuation is not carried out from a main frame. About this detail, it mentions later.

[0014] A processor B110 consists of the opening system host 111, SCSI interface (Small Computer System Interface) 112, a disk controller B113, a disk unit group B114, and a service processor B115. The record used as the unit of read/write accesses the opening system host 111 through SCSI interface 112 which is a fixed length at a disk controller B113. The disk controller A104 and the disk controller B113 are connected by the channel 108. The SCSI cable b117 is sufficient as a channel 108. Hereafter, a CKD format, and a call and a fixed length block format are called a FBA (Fixed Block Architecture) format for count key data format. Hereafter, a CKD record and the record of a FBA format are called a FBA record for the record of a CKD format.

[0015] Drawing 2 is drawing showing other examples of the computer system set as the object of this invention, and the I/O subsystem for two or more open systems is connected to one I/O subsystem for main frames. At a processor X120, the interface of the opening system host X121 and a disk controller X123 is Fibre. It connects with the Channel interface 122. Fibre The Channel interface 122 is an optical cable and can expand the connection distance between control units with a host. However, it is Fibre which used SCSI as the base between a host and a control device. A Channel interface is adopted in many cases. Moreover, between a disk controller X123 and disk controllers B113 is Fibre. You may connect with an interface like the Channel interface X126.

[0016] The data backup in the configuration of drawing 2 serves as an escape of the data backup in the configuration of drawing 1 R> 1. Fundamental actuation of each equipment accesses the magnetic tape library 107 a mainframe 101 and whose opening system hosts 111 and 121 are external storage through each interface or the disk unit group A105, the disk unit group B114, and the disk unit group X124. The operating system of arbitration with which the process of a main frame 101 supports a channel interface. Under the control of VOSJ (Virtual-storage Operating System3) etc. of Hitachi, for example, moreover, an opening system host's process The operating system of the arbitration which supports a SCSI interface. For example, the path of DETAHE stored outside through each interface under control of operating systems, such as UNIX (UNIX is a trademark in the U.S. of an X/Open company and other countries), is established.

[0017] Drawing 3 is drawing showing the configuration of a disk controller A104. A disk controller A104 consists of Buss 308 who connects between MPU302 which performs the control-system process 307 of this disk controller, a memory apparatus 301, the host data transfer unit 303, disk cache equipment 304, the I/O intersubsystem data transfer unit 305, the disk transfer equipments 306, and these equipments. The control-system process 307 operates in multitasking or a multiprocessor environment. The various micro programs 312 and various data 313+ss are contained in a memory apparatus 301. Especially, in the case of the disk controller A104, as explanation of drawing 1 R> 1 also described, the contingency equipment connection

disk information 314 and the other control-devices connection disk information 315 are stored. Since a disk controller B113 and a disk controller X123 are also the same configurations, it omits. However, in the case of a disk controller B113 and a disk controller X123, it is not necessary to include the contingency equipment connection disk information 314 and the other control-devices connection disk information 315.

[0018] The contingency equipment connection disk information 314 shows connection relation, such as a control device stored in the memory apparatus 301 of a disk controller A104. The contingency equipment connection disk information 314 is information which exists in disk unit correspondence. The contingency equipment connection disk information 314 is shown in drawing 4. The device address 400 is an identifier for identifying disk ** which the host computer of main frame 101 grade makes a read/write object, and the host computer of main frame 101 grade is the information included also in the read/write demand to publish. It is the information the disk unit corresponding to this control-device connection disk information 314 in the contingency equipment initial entry 401 indicates it to be whether it has actually connected with the control device. The other control-devices connection pointer 402 means whether this control-device connection disk information 314 is assigned to the disk unit connected to other control devices. When assigned, a pointer corresponds and also points to the control-device connection disk information 315. A pointer is a null value when not assigned. Therefore, when the other control unit connection pointer 402 is effective, the contingency equipment initial entry 401 is in the condition of not being assigned (when the device address 400 is assigned to the disk unit connected to other control units). Moreover, when the other control unit connection pointer 402 is invalid, the condition that the contingency equipment initial entry 401 is not assigned may be shown (when the device address 400 is not assigned to the disk unit connected to other control units). That is, there may be the condition of the device address 400 not being assigned to the disk unit linked to contingency equipment, either, and not being assigned to the disk unit connected to other control devices. An attribute 403 is shown in drawing 5 which is the information on equipment proper, such as an interface of the corresponding disk unit, a function, a data format type, and the block length, and also the control-device connection disk information 315 is the information corresponding to the disk unit which has not carried out direct continuation to a disk controller A104. The other control-devices connection disk information 315 will be pointed at from either of the contingency equipment connection disk information 314. The address of the control device to which the disk unit corresponding to the control-device connection disk information 315 besides a book in the connection control-device address 500 is connected is stored. The disk controller B113 will be stored in this example. A disk address 501 shows the address currently assigned in the control unit actually connected to the corresponding disk unit. The contingency equipment connection disk information 314 and the other control-devices connection disk information 315 are set up from a service processor 109.

[0019] In this example, by using for the information on drawing 4, the contingency equipment connection disk information 314 shown in drawing 5, and the other control-devices connection disk information 315, as shown in drawing 6, it is recognized as the disk unit group B114 (Disk C, Disk D) connected through the disk controller B113 being connected to a disk controller A104 from the main frame 101. This is because the disk controller A104 is assigning the address of the disk unit which is vacant in the disk controller A104 to the disk unit of the I/O subsystem of an opening system.

[0020] Hereafter, the contents of processing of a backup process are explained using drawing 1 RX 1, drawing 7, and drawing 8. Specifically in drawing 1, the data of the disk unit group B114 of the opening system of Processor B are backed up to MT library system 116 through the disk controller A104 of Processor A, and a main frame 101. On the contrary, the data which backed up to MT library system 116 are restored in the disk unit group B114 of the opening system of Processor B through the main frame 101 of Processor A, and a disk controller A104. The above-mentioned backup and restoration first explain the case which backs up the data of the disk unit group B114 of the opening system of Processor B to MT library system 116 through the disk controller A104 of Processor A, and a mainframe 101 where it performs with directions by the mainframe 101. In addition, as already stated, it is recognized as the disk unit group B114 (Disk

C, Disk D) being connected to a main frame 101 at the disk unit A104. Therefore, a lead demand is published, and actuation of a main frame 101 is not only especially explained to a disk controller A104, in order to only back up the received data to MT library system 116.

[0021] When backing up to MT library system 116, a main frame 101 publishes a lead demand to a disk controller A104. A disk controller A104 performs processing in response to the lead demand from a mainframe 101 according to the flow Fig. of drawing 7. First, the corresponding contingency equipment connection disk information 314 is found out at step 700 from the address of a disk unit specified within the lead demand. At step 701, the specified disk unit confirms whether to connect with the disk controller A104. If it connects with the disk controller A104, the data which correspond from the disk unit will be read at step 702. If it does not connect with the disk controller A104, at step 703, the specified disk unit confirms whether to connect with other disk controllers (disk controller B113). That is, it is checked a null value for the other control-devices connection pointer 402. It is a null value as a result of the check, and when not connecting, an error report is performed at step 704.

[0022] The actuation especially related to this invention is 705 or less step [which the specified disk unit performs when connecting with other disk controllers (disk controller B113)] actuation. First, do not become a null value as a result of a check, but when connecting in step 705, it is based on the value of the other control unit connection pointer 402. Correspond to the specified disk unit, and also the control-device connection disk information 315 A header, it found out and also the specified disk unit gains the address of the disk controller (disk controller B113) actually connected, and the address of the disk unit in the inside of the disk unit group B connected to the disk controller based on the control-device connection disk information 315. Next, at step 706, the address of the data to lead received by the lead demand is changed into the format of a disk unit of having connected with the disk controller B113.

[0023] In the read/write demand from a main frame 101, the address of the data to write is usually specified by the cylinder number, the head number, and the record number according to a CKD format. Hereafter, the record address expressed with a cylinder number, a head number, and a record number is called CCHHR. On the other hand, in the disk unit connected to the disk controller B113, it has the access interface specified by LBA (Logical Block Address) according to a FBA format. Therefore, at step 706, the access address of the data for a lead is changed into a FBA format from a CKD format. Transformation is for example, $LBA = (CC * \text{number of heads} + HH) * \text{Track length} + \text{it can express like the record-number} * \text{record length}$.

[0024] A demand is published [reading data from the field calculated at step 706 of the corresponding disk unit to a disk controller B113, and] at step 707. Step 708 waits for the demanded data to come from a disk controller B113. At step 709, delivery and processing are completed for the data received from the disk controller B113 to a mainframe 101. In order that the data demanded from the disk controller A104 may be read from the corresponding disk unit and disk controller B113 may only send them to a disk controller A104, especially a processing flow is not indicated.

[0025] Next, the case where the data which backed up to MT library system 116 are restored in the disk unit group B114 of the opening system of Processor B through the disk controller A104 of Processor A and a main frame 101 is explained. In addition, as already stated, it is recognized as the disk controller group B113 (Disk C, Disk D) being connected to a main frame 101 at the disk unit A104. Therefore, actuation of a main frame 101 is not especially explained, in order to only publish a light demand so that the data read from MT library system 116 to the disk controller A104 may be written in.

[0026] A disk controller A104 performs processing in response to the light demand from a mainframe 101 according to the flow Fig. of drawing 8. In the processing flow of drawing 8, since the processing in steps 800-801 and steps 803-806 is the same as the processing in steps 700-701 in drawing 7, and steps 703-706, explanation is omitted. Moreover, since the demand from a mainframe 101 is a light demand, step 802 usually serves as light processing.

[0027] Below, only a different part from drawing 7 is explained. At step 807, the demand which writes data in the field calculated at step 807 of the corresponding disk unit is published to a disk controller B113. Next, at step 808, it writes in from a main frame 1101 and data are sent to

a receipt and a disk controller B113. Next, if waiting and a completion report are received for the completion report of a light demand from a disk controller B113 at step 809, delivery and processing will be completed for a completion report to a mainframe 101. In order that the data demanded from the disk controller A104 may be read from the corresponding disk unit and control-device 113B may only send them to a disk controller A104, especially a processing flow is not indicated.

[0028] As mentioned above, although the system which backs up the data of the disk unit group B114 of the opening system of Processor B by Processor A was explained, it is good also considering the I/O subsystem which connects disk controller B and the disk unit group B to Processor A, and you may make it constitute the compound I/O system which connected two I/O subsystems with which interfaces differ in a main frame, and is connected to it in this case as other examples as three or more.

[0029]
[Effect of the Invention] By this invention, backup of data is enabled in the I/O intersubsystem from which an access interface differs. Consequently, the data of the I/O subsystem of an opening system can be backed up to the I/O subsystem of a main frame. Moreover, since the backup device of a main frame contains large capacity, high performance, and MT library system of high reliance, they are high performance and a backup device of the main frame of high reliance, and can back up the data of the I/O subsystem of an open system. Moreover, it becomes possible to connect an I/O subsystem which is different in a main frame.

[Translation done.]

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.*** shows the word which can not be translated.
- 3.in the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

- [Drawing 1] It is drawing showing an example of the outline of the system of an example.
 - [Drawing 2] It is drawing showing other examples of the outline of the system of an example.
 - [Drawing 3] It is drawing showing the configuration of a disk controller.
 - [Drawing 4] It is drawing showing the configuration of continence equipment connection disk information.
 - [Drawing 5] It is drawing showing the configuration of other control-devices connection disk information.
 - [Drawing 6] It is drawing showing the connection relation of the disk unit seen from the main frame.
 - [Drawing 7] It is drawing showing an example of the processing flow of disk controller A at the time of backing up the data of the I/O subsystem of an opening system to MT library system of a main frame.
 - [Drawing 8] It is drawing showing an example of the processing flow of disk controller A at the time of restoring data in the I/O subsystem of an opening system from MT library system of a main frame.
- [Description of Notations]
- 101 Mainframe
 - 102, 103, 122 Channel interface
 - 111 121 Opening system host
 - 112 SCSI Interface
 - 104, 113, 123 Disk controller
 - 105, 114, 124 Disk unit group
 - 106 Tape Control
 - 107 Magnetic Tape Library
 - 108 Channel
 - 109, 115, 125 Service processor
 - 116 MT Library System
 - 130 Library Control Unit
 - 301 Memory Apparatus
 - 302 MPU
 - 303 Host Data Transfer Unit
 - 304 Disk Cache Equipment
 - 305 I/O Intersubsystem Data Transfer Unit
 - 306 Disk Transfer Equipment
 - 307 Control-System Process
 - 312 Micro Program
 - 313 Data
 - 314 Continence Equipment Connection Disk Information
 - 315 Other Control-Devices Connection Disk Information

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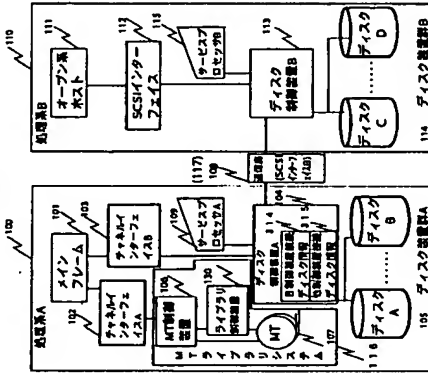
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(54)【発明の名称】 複合計算機システムおよび複合I/Oシステム

(57)【要約】

【課題】 オープン用のI/Oサブシステムのデータを該I/Oサブシステムに直接されないメインフレーム管理のバックアップシステムにバックアップする。
【解決手段】 オープン用のB系I/Oサブシステム(113、114)とメインフレーム用のA系I/Oサブシステム(104、105)とを連携手段で接続し、B系I/Oサブシステムに接続されたディスクのデータをMTライブラリシステムにバックアップするため、B系I/OサブシステムのデータをメインフレームからアクセスできるようにA系I/Oサブシステムに、自サブシステム内の空いている記憶装置アドレスをオープン用のI/Oサブシステムの記憶装置に割り当てるためのテーブル(314、315)を設け、メインフレームから受け付けられた可変長記録形式の要求を、B系の固定長記録形式に変換し、前記テーブルに基づき指定されたディスクにアクセスし、得られたデータをメインフレームに送り、バックアップシステムにバックアップする。

図 1



【特許請求の範囲】

【請求項1】 第1のホストコンピュータと、前記第1のホストコンピュータと可変長記録形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第1のI/Oサブシステムと、第2のホストコンピュータと、前記第2のホストコンピュータと固定長記録形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第2のI/Oサブシステムと、前記第1のI/Oサブシステムと前記第2のI/Oサブシステムを接続する通信機構を含む複合計算機システムであって、前記第1のI/Oサブシステムは、

外部記憶装置の装置アドレスと、該装置アドレスが第1または第2のI/Oサブシステムの外部記憶装置のいずれに割り当てられているかを示す情報と、第2のI/Oサブシステムの外部記憶装置に割り当てられている場合に該外部記憶装置の第2のI/Oサブシステムにおける装置アドレスとを格納するテーブルと、

前記第1のホストコンピュータから、リード/ライトすべき外部記憶装置アドレスを含み、かつ、前記可変長記録形式インターフェイスにしたがったリード/ライト要求を受け取った時、前記テーブルを参照して、前記リード/ライト要求に含まれる外部記憶装置アドレス中の装置アドレスが、前記第1のI/Oサブシステムに含まれる外部記憶装置に割り当てられてなく、前記第2のI/Oサブシステムに含まれる外部記憶装置に割り当てられている場合は、前記可変長記録形式インターフェイスにしたがった前記リード要求を、前記第2のI/Oサブシステムに送る手段と、

前記第2のI/Oサブシステムに送ることを決定した前記可変長記録形式インターフェイスにしたがった前記リード/ライト要求を、前記固定長インターフェイスにしたがったリード/ライト要求に変換して、前記第2のI/Oサブシステムに送る手段を有することを特徴とする複合計算機システム。

【請求項2】 第1のホストコンピュータと、前記第1のホストコンピュータと可変長記録形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第1のI/Oサブシステムと、前記第1のホストコンピュータに接続されたバックアップサブシステムと、第2のホストコンピュータと、前記第2のホストコンピュータと固定長記録形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第2のI/Oサブシステムと、前記第1のI/Oサブシステムと前記第2のI/Oサブシステムを接続する通信機構を含む複合計算機システムであって、

前記第1のホストコンピュータは、前記第1のI/Oサブシステムに対して、データをリードすべき外部記憶装置のアドレスを含み、かつ前記可変長記録形式インターフェイスにしたがったリード要求を発行して、前記第1のI/Oサブシステムから受け取ったデータを、前記第1

ックアップシステムにバックアップする手段を有し、

前記第1のI/Oサブシステムは、該装置アドレスが第1または第2のI/Oサブシステムの外部記憶装置のいずれに割り当てられているかを示す情報と、第2のI/Oサブシステムの外部記憶装置に割り当てられている場合に該外部記憶装置の第2のI/Oサブシステムにおける装置アドレスとを格納するテーブルと、

前記第1のホストコンピュータから、リードすべき外部記憶装置アドレスを含み、かつ、前記可変長記録形式インターフェイスにしたがったリード要求を受け取った時、前記テーブルを参照して、前記リード要求に含まれる外部記憶装置アドレス中の装置アドレスが、前記第1のI/Oサブシステムに含まれる外部記憶装置に割り当てられてなく、前記第2のI/Oサブシステムに含まれる外部記憶装置に割り当てられている場合は、前記可変長記録形式インターフェイスにしたがった前記リード要求を、前記第2のI/Oサブシステムに送ることを決定する手段と、

前記第2のI/Oサブシステムに送ることを決定した前記可変長記録形式インターフェイスにしたがった前記リード要求を、前記固定長インターフェイスにしたがったリード要求に変換して、前記第2のI/Oサブシステムに送り、前記第2のI/Oサブシステムから受け取ったデータを、前記第1のホストコンピュータに送る手段を有することを特徴とする複合計算機システム。

【請求項3】 第1のホストコンピュータと、前記第1のホストコンピュータと可変長記録形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第1のI/Oサブシステムと、前記第1のホストコンピュータに接続されたバックアップサブシステムと、第2のホストコンピュータと、前記第2のホストコンピュータと固定長記録形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第2のI/Oサブシステムと、前記第1のI/Oサブシステムと前記第2のI/Oサブシステムを接続する通信機構を含む複合計算機システムであって、

前記第1のホストコンピュータは、前記第1のI/Oサブシステムに対して、データをリードすべき外部記憶装置のアドレスを含み、かつ前記可変長記録形式インターフェイスにしたがったリード要求を発行して、前記バックアップシステムから読み出したデータを前記第1のI/Oサブシステムに送る手段を有し、

前記第1のI/Oサブシステムは、外部記憶装置の装置アドレスと、該装置アドレスが第1または第2のI/Oサブシステムの外部記憶装置のいずれに割り当てられているかを示す情報と、第2のI/Oサブシステムの外部記憶装置に割り当てられている場合に該外部記憶装置の第2のI/Oサブシステムにおける装置アドレスとを格納するテーブルと、

スにしたがった前記リード要求を、前記第2の1/0サブシステムに送る手段と、前記第2の1/0サブシステムに送ることを決定した前記可変記録形式インターフェイスにしたがった前記リード要求を、前記固定長インターフェイスにしたがったリード要求に変換して、前記第2の1/0サブシステムに送り、前記第2の1/0サブシステムから受け取ったデータを、前記第1のホストコンピュータに送る手段を有するようにしている。

【0008】また、第1のホストコンピュータと、前記第1のホストコンピュータと可変記録形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第1の1/0サブシステムと、前記第1のホストコンピュータに接続されたバックアップシステムと、第2のホストコンピュータと、前記第2のホストコンピュータと固定長記録形式インターフェイスで直接接続され、1つ以上の外部記憶装置を含む第2の1/0サブシステムと、前記第1の1/0サブシステムと前記第2の1/0サブシステムを接続する通信機構を含む複合計算機システムであり、前記第1のホストコンピュータは、前記第1の1/0サブシステムに対して、データをライトすべ

き外部記憶装置のアドレスを含み、かつ前記可変記録形式インターフェイスにしたがったライト要求を発行して、前記バックアップシステムから読み出したデータを、前記第1の1/0サブシステムに送る手段を有し、前記第1の1/0サブシステムは、外部記憶装置の装置アドレスと、該装置アドレスが第1または第2の1/0サブシステムの外部記憶装置のいずれに割り当てられているかを示す情報と、第2の1/0サブシステムの外部記憶装置に割り当てられている場合に該外部記憶装置の第2の1/0サブシステムにおける装置アドレスとを格納するテーブルと、前記第1のホストコンピュータから、ライトすべき外部記憶装置のアドレスを含み、かつ、前記可変記録形式インターフェイスにしたがったライト要求を受け取った時、前記テーブルを参照して、前記ライト要求に含まれる外部記憶装置アドレス中の装置アドレスが、前記第1の1/0サブシステムに含まれる外部記憶装置に割り当てられてなく、前記第2の1/0サブシステムに含まれる外部記憶装置に割り当てられている場合、前記可変記録形式インターフェイスにしたがったライト要求を、前記第2の1/0サブシステムに送ることを決定する手段と、前記第2の1/0サブシステムに送ることを決定した前記可変記録形式インターフェイスにしたがったライト要求を、前記固定長インターフェイスに送る手段を有するようにしている。

【0009】また、1つ以上の外部記憶装置を含む第1の1/0サブシステムと、該第1の1/0サブシステム

に接続され、1つ以上の外部記憶装置を含む第2の1/0サブシステムとを含み、ホストコンピュータに接続された場合1/0システムであり、前記第1の1/0サブシステムは、外部記憶装置の装置アドレスと、該装置アドレスが第1または第2の1/0サブシステムの外部記憶装置のいずれに割り当てられているかを示す情報と、第2の1/0サブシステムの外部記憶装置に割り当てられている場合に該外部記憶装置の第2の1/0サブシステムにおける装置アドレスとを格納するテーブルと、前記ホストコンピュータからリード/ライトすべき外部記憶装置アドレスを指定したリード/ライト要求を受け取った時、前記テーブルを参照して、指定された前記外部記憶装置アドレス中の装置アドレスが、前記第1の1/0サブシステムに含まれる外部記憶装置に割り当てられてなく、前記第2の1/0サブシステムに含まれる外部記憶装置に割り当てられてなく、前記第2の1/0サブシステムにおける装置アドレスとを格納するテーブルと、前記ホストコンピュータから、リード/ライトすべき外部記憶装置のアドレスを含み、かつ、前記可変記録形式インターフェイスにしたがったライト要求を受け取った時、前記テーブルを参照して、前記ライト要求に含まれる外部記憶装置アドレス中の装置アドレスが、前記第1の1/0サブシステムに含まれる外部記憶装置に割り当てられてなく、前記第2の1/0サブシステムに含まれる外部記憶装置に割り当てられている場合、前記可変記録形式インターフェイスにしたがったライト要求を、前記第2の1/0サブシステムに送ることを決定する手段と、前記第2の1/0サブシステムに送ることを決定した前記可変記録形式インターフェイスにしたがったライト要求を、前記固定長インターフェイスに送る手段を有するようにしている。

【0010】また、可変記録形式インターフェイスを有し、1つ以上の外部記憶装置を含む第1の1/0サブシステムと、固定長記録形式インターフェイスを有し、1つ以上の外部記憶装置を含む第2の1/0サブシステムと、前記第1の1/0サブシステムと前記第2の1/0サブシステムを接続する通信機構とを含み、ホストコンピュータに接続された場合1/0システムであり、前記第1の1/0サブシステムは、外部記憶装置の装置アドレスと、該装置アドレスが第1または第2の1/0サブシステムの外部記憶装置のいずれに割り当てられているかを示す情報と、第2の1/0サブシステムの外部記憶装置に割り当てられている場合に該外部記憶装置の第2の1/0サブシステムにおける装置アドレスとを格納するテーブルと、前記ホストコンピュータから、リード/ライトすべき外部記憶装置のアドレスを含み、かつ、前記可変記録形式インターフェイスにしたがったライト要求を受け取った時、前記テーブルを参照して、前記ライト要求に含まれる外部記憶装置アドレス中の装置アドレスが、前記第1の1/0サブシステムに含まれる外部記憶装置に割り当てられてなく、前記第2の1/0サブシステムに含まれる外部記憶装置に割り当てられている場合、前記可変記録形式インターフェイスにしたがったライト要求を、前記第2の1/0サブシステムに送ることを決定する手段と、前記第2の1/0サブシステムに送ることを決定した前記可変記録形式インターフェイスにしたがったライト要求を、前記固定長インターフェイスに送る手段を有するようにしている。

【0011】
【発明の実施の形態】以下、本発明の一実施例を、図面により説明する。

【0012】図1は、本発明の対象となる計算機システムの一例を示す図である。処理系A100は、メインフレーム101、チャネルインターフェイスA102、チャネルインターフェイスB103、磁気テープ(MT)制御装置106、磁気テープライブラリ制御装置130、磁気テープライブラリ107、ディスク制御装置A104、ディスク装置群A105、サービスプロセッサ109から構成される。メインフレーム101は、クライアントキーデータ形式と呼ばれる可変レコード形式に従ってチャネルインターフェイスB103を介して、ディスク制御装置A104にアクセスする。ここで、クライアントキーデータ形式とは、リード/ライトの単位となるレコードをカウント順、キー順、データ順と呼ぶ3つのフィールドから構成するレコード形式である。カウント順には、レコードの識別子、キー順には、このレコードをアクセスするためのキー情報、データ順には、アプリケーションプログラムが使用するデータが格納される。なお、以下、磁気テープ(MT)制御装置106、磁気テープライブラリ制御装置130、磁気テープライブラリ107を併せてMTライブラリシステム116として参照する。チャネルインターフェイスを介して接続される記憶装置としては、磁気テープだけでなく、光ディスク等がある。以下では、MTライブラリシステム116が接続されている場合を例に示す。

【0013】ディスク制御装置A104には、制御装置接続ディस्क情報314、他制御装置接続ディस्क情報315が含まれる。制御装置接続ディस्क情報314、他制御装置接続ディस्क情報315は、メインフレームから直接接続されない1/0サブシステムのディस्क装置のアクセスを可能にするために設けた情報である。この詳細については、後述する。

【0014】処理系B110は、オープン系ホスト111、SCSIインターフェイス(Small Computer System Interface)112、ディスク制御装置B113、ディスク装置群B114、サービスプロセッサ115から構成される。オープン系ホスト111は、リード/ライトの単位となるレコードが固定長であるSCSIインターフェイス112を介して、ディスク制御装置B113にアクセスする。ディスク制御装置A104とディスク制御装置B113は、通信路108で接続されている。通信路108は、例えば、SCSIケーブル117でもよい。以下、クライアントキーデータ形式をCKD形式と呼び、固定長ブロック形式をFBA(Fixed Block Architecture)形式と呼ぶ。以下、CKD形式のレコードをCKDレコード、FBA形式のレコードをFBAレコードと呼ぶ。

【0015】図2は、本発明の対象となる計算機システムの他の一例を示す図であり、1つのメインフレーム用の1/0サブシステムに2つ以上のオープンシステム用の1/0サブシステムが接続されている。処理系X12

0では、オープン系ホストX121とディस्क制御装置X123のインターフェイスがFibre Channelインターフェイス122で接続されている。Fibre Channelインターフェイス122は、光ケーブルであり、ホストと制御装置間の接続距離を拡大できる。ただし、ホストと制御装置の間は、SCSIをベースとしたFibre Channelインターフェイスを採用されることが多い。また、ディस्क制御装置X123とディस्क制御装置B113の間も、Fibre ChannelインターフェイスX126のようなインターフェイスで接続されている。

【0016】図2の構成でのデータバックアップは、図1の構成でのデータバックアップの拡張となる。各装置の基本的な動作は、メインフレーム101、オープン系ホスト111、121は、各々のインターフェイスを介して、外部記憶装置である磁気テープライブラリ107、あるいはディस्क装置群A105、ディस्क装置群B114、ディस्क装置群X124をアクセスする。メインフレーム101のプロセッサは、チャネルインターフェイスをサポートする任意のオペレーティング・システム、例えば日立製作所のVOS3(Virtual Storage Operating System)等の制御下で、また、オープン系ホストのプロセッサは、SCSIインターフェイスをサポートする任意のオペレーティング・システム、例えばUNIX(UNIXはX/Open社の米国、およびその他の国における登録商標である)等のオペレーティング・システムの制御下で、各々のインターフェイスを介して外部に格納されているデータへの経路を成立する。

【0017】図3は、ディस्क制御装置A104の構成を示す図である。ディस्क制御装置A104は、本ディस्क制御装置の制御系プロセッサ307を実行するMPU302、メモリ装置301、ホストデータ転送装置303、ディस्क・キャッシュ装置304、1/0サブシステム間データ転送装置305、ディस्क転送装置306、これらの装置間を接続するためのバス308から成る。制御系プロセッサ307はマルチタスク、あるいはマルチプロセス環境で動作する。メモリ装置301には、各種マイクログラム312、各種データ313、が含まれる。特に、ディस्क制御装置A104の場合には、図1の説明でも述べたように、制御装置接続ディस्क情報314、他制御装置接続ディस्क情報315が格納されている。ディस्क制御装置B113、ディस्क制御装置X123も同様の構成であるため、省略する。ただし、ディस्क制御装置B113、ディस्क制御装置X123の場合には、制御装置接続ディस्क情報314、他制御装置接続ディस्क情報315を含む必要はない。

【0018】制御装置接続ディस्क情報314は、ディस्क制御装置A104のメモリ装置301に格納されている制御装置等の接続関係を示す。制御装置接続デ

- 【図5】他制御装置接続ディスク情報の構成を示す図である
- 【図6】メインフレームから見たディスク装置の接続関係を示す図である。
- 【図7】オープン系のI/OサブシステムにバックアップインフレームのMTライブラリシステムにバックアップする際のディスク制御装置Aの処理フローの一例を示す図である。
- 【図8】メインフレームのMTライブラリシステムから、オープン系のI/Oサブシステムに、データをリストアする際のディスク制御装置Aの処理フローの一例を示す図である。
- 【符号の説明】
- 101 メインフレーム
 - 102、103、122 チャネルインターフェイス
 - 111、121 オープン系ホスト
 - 112 SCSIインターフェイス
 - 104、113、123 ディスク制御装置
 - 105 ディスク装置群A
 - 114 ディスク装置群B
 - 106 磁気テープ制御装置
 - 107 磁気テープライブラリ
 - 108 通信路
 - 109、115、125 サービスプロセッサ
 - 116 MTライブラリシステム
 - 130 ライブラリ制御装置
 - 301 メモリ装置
 - 302 MPU
 - 303 ホストデータ転送装置
 - 304 ディスク・キャッシュ装置
 - 305 I/Oサブシステム間データ転送装置
 - 306 ディスク転送装置
 - 307 制御系プロセッサ
 - 312 マイクロプログラム
 - 313 データ
 - 314 制御装置接続ディスク情報
 - 315 他制御装置接続ディスク情報

【図1】

図1

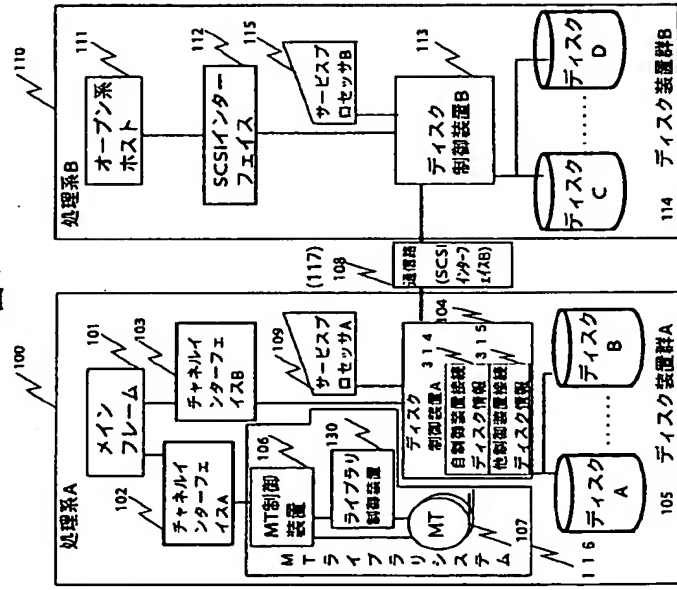
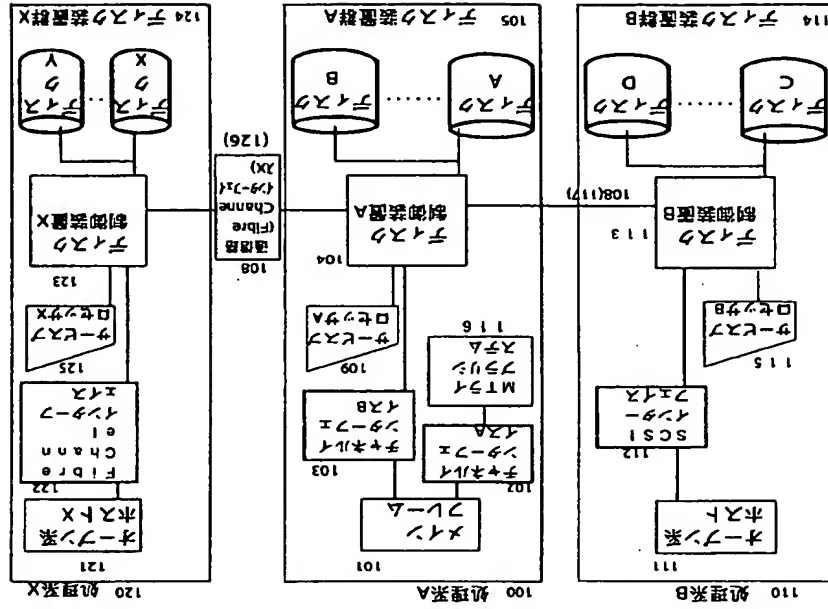


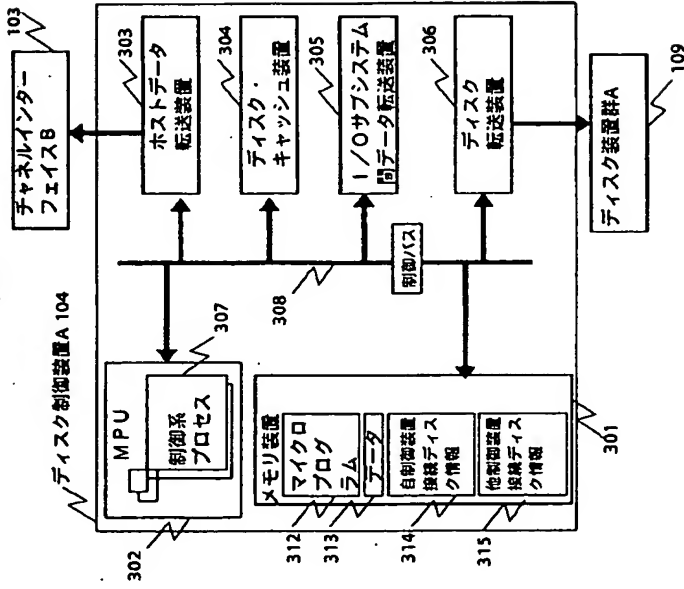
図2

【図2】



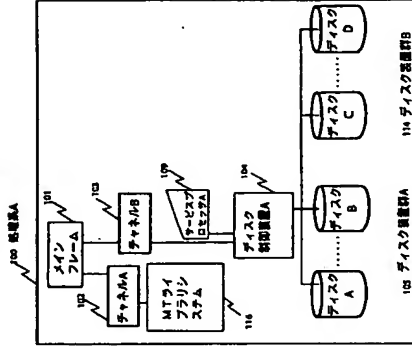
【図3】

図3



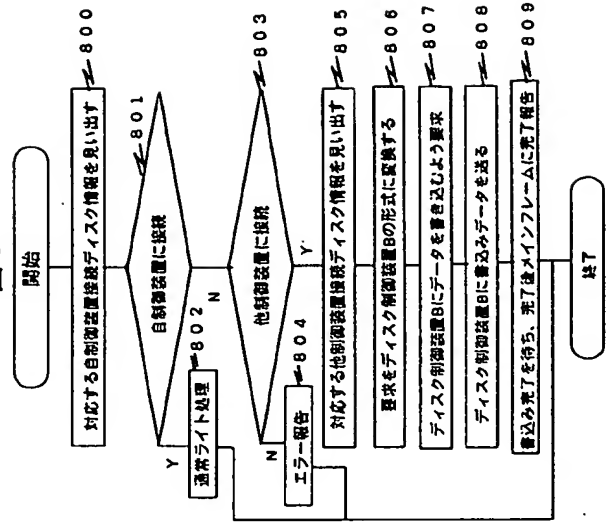
【図6】

図6



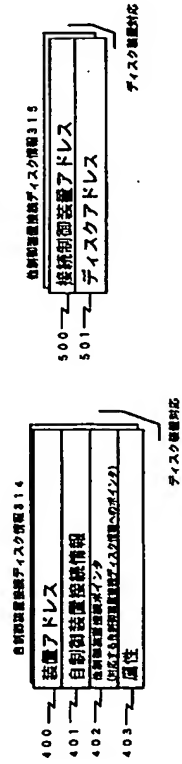
【図8】

図8



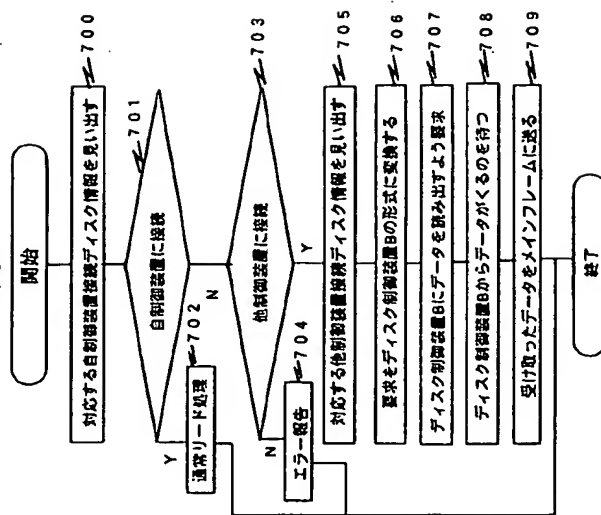
【図5】

図5



【図7】

図7



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